

REMARKS

Summary

This Amendment is responsive to the Office Action mailed on October 7, 2003. Claims 56, 58, 59, 66, 75, 79, 80, 84, 88, 89, and 98 are amended.

As requested by the Examiner, Applicant hereby affirms the election made by Applicant's counsel during a telephone call with the Examiner on September 8, 2003, to prosecute the invention of Group I, claims 56-98.

The Examiner has indicated that claims 61, 80-85, 89, 91, and 92 contain allowable subject matter.

As a preliminary matter, Applicant notes that the Office Action did not include an initialed copy of Applicants' PTO-1449 forms submitted with Applicant's Information Disclosure Statement filed on September 22, 2003. Applicant submits herewith a copy of Applicant's PTO-1449 form and respectfully requests that the Examiner initial and return this form with the next correspondence.

The Examiner has objected to the title of the application as not being descriptive of the claimed invention. The title is amended herein in accordance with the Examiner's suggestion. Withdrawal of the objection to the title is respectfully requested.

The Examiner has objected to the drawings for the following reasons: (1) reference number "20" has been used to designate both a "regulation device" (page 22, line 16) and a "signal line" (page 22, line 16); reference number "90" has been used to designate both a "seal" (page 24, line 4) and a "strip of film" (page 24, line 7); and reference number "118" and reference number "18" have both been used to designate a "semifinished fiber article" (page 27, lines 4 and 24).

Applicant respectfully submits that the objections of the Examiner reflect errors in the specification rather than errors in the drawings. The specification is amended herein to overcome the Examiner's objections to the drawings. In particular, reference number "20" on page 22, line 16 is amended to --68-- to conform to Figure 1; reference number "90" on page 24, line 7 is amended to --92-- in accordance with Figure 2; and reference numeral "18" on page 27, lines 10 and 24 is amended to --118-- in accordance with Figure 6. Withdrawal of the objections to the drawings is therefore respectfully requested.

Claims 79, 84, 85, 89, 91, and 92 stand rejected under 35 U.S.C. § 112 as being indefinite. Claims 79, 84, and 89 are amended herein to overcome the rejection under 35 U.S.C. § 112, withdrawal of which is respectfully requested. With regard to claim 89, Applicant points out that the distribution fabric set forth in the claim corresponds to the distribution fabric 82 shown in Figure 2 and described on page 23, last paragraph.

Claims 56, 57, 62, 68, 86, 93 and 97 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Livesay (US 5,837,185).

Claims 56-58, 62, 63, 65-74, 77, 78, 86-88, 90, 93, 94 and 97 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Palmer (US 4,942,013) in view of Livesay.

Claims 59 and 60 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Palmer and Livesay in view of King (US 5,528,155).

Claim 64 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Palmer and Livesay in view of FR 2 771 960.

Claim 75 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Palmer and Livesay in view of Walsh (US 5,210,499).

Claim 76 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Palmer and Livesay in view of Holtzberg (US 5,849,229).

Claim 79 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Palmer and Livesay in view of Russell (US 4,201,823).

Claim 95 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Palmer and Livesay in view of Wejrock (US 5,256,366).

Claim 96 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Palmer and Livesay in view of Brown (H465).

Claim 98 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Palmer and Livesay in view of Tunis (US 6,159,414).

Applicant respectfully traverses these rejections in view of the amended claims and the comments which follow.

Discussion of Amended Claims

Claim 56 is amended to clarify that the application of the liquid resin includes resin infiltration and curing (see, e.g., Applicant's specification, page 2, last paragraph; page 3, last paragraph; and page 32, lines 11-24).

Claims 58, 59, 66, 75, 79, 80, 84, 88, 89, and 98 are amended to conform to amended claim 56 and/or to overcome rejections under 35 U.S.C. § 112 noted by the Examiner, as well as other potential rejections noted by Applicant.

Discussion of the Present Invention

In accordance with the present invention, throughout the production process, whenever there is danger of boiling of the resin, the vacuum pressure is controlled together with the temperature such that during application of the liquid resin, including during resin infiltration and curing, the boiling point curve of the resin is not exceeded.

Thus, heat curing resins can be used (such as Hexcel RTM 6). Such heat curing resins usually have a low viscosity as well as a relatively low boiling pressure. With the inventive method it is guaranteed throughout the complete process (including resin infiltration and curing) that the boiling point curve is not reached and that therefore no gas bubbles will result. Therefore, structural components manufactured with the inventive method are practically free from bubbles and a high degree of repetition is guaranteed (see, e.g., Applicant's specification, page 2, last paragraph).

The present invention enables the manufacture of structural components with large surface areas using a vacuum injection process without the need to provide an autoclave. Therefore, the costs of manufacturing a component are reduced considerably (see, e.g., Applicant's specification, page 3, first paragraph).

Experience shows that once bubbles are formed they are extremely difficult to remove. With the inventive process, the formation of bubbles is prevented.

Discussion of Livesay

The Examiner has rejected claim 56 as being anticipated by Livesay. This rejection is respectfully traversed. An anticipation rejection requires that each and every element of the claimed invention as set forth in the claim be provided in the cited reference. See *Akamai Technologies Inc. v. Cable & Wireless Internet Services Inc.*, 68 USPQ2d 1186 (CA FC 2003), and cases cited therein. As discussed in detail below, Livesay does not meet the requirements for an anticipation rejection.

Livesay discloses a process for preparing fiber reinforced composite structures utilising resin transfer molding techniques (Abstract). Livesay discloses that after wetting out the fibers

with resin, the vacuum is brought to a certain pressure to prevent boiling of the styrene in the resin as the temperature rises during the curing exotherm (col. 7, line 66 to col. 8, line 3).

Livesay does not disclose or remotely suggest that vacuum pressure and temperature are controlled together, as claimed by Applicant. In particular, Livesay does not disclose or remotely suggest that vacuum pressure and temperature are controlled during resin infiltration, as claimed by Applicant. To the contrary, in Livesay, only after resin infiltration (i.e. wetting out of the fibers) is the vacuum pressure adjusted such that boiling is prevented (col. 7, line 66-67).

Further, Livesay is not directed towards the use of a heat curing resin as is Applicant's claimed invention. In Livesay, curing of the resin is induced via ultraviolet radiation (col. 8, line 22), rather than thermally as in Applicant's claimed invention.

As Livesay does not disclose each and every element of the invention as claimed, the rejection under 35 U.S.C. § 102(b) is believed to be improper, and withdrawal of the rejection is respectfully requested. See, *Akamai Technologies Inc., supra*.

Discussion of Palmer

The Examiner has also rejected claim 56 as being obvious over Palmer in view of Livesay.

Palmer discloses a process for vacuum impregnation of a fiber reinforcement, such as a carbon cloth, with a resin to produce a resin-fiber composite. Palmer discloses that a tool used for controlling resin flow is heated prior to the start of resin impregnation to a prescribed temperature (col. 13, lines 36-37). The resin is usually degassed after mixing of the hardener/catalyst in the resin, to eliminate or remove all entrapped air from the liquid resin (col. 8, lines 21-23).

The removal of the entrapped air is a process that takes place before resin infiltration in the system of Palmer. Furthermore, Palmer indicates that the resin should be capable of preceding through a vacuum pressure cure cycle environment of heat and time without formation of gas bubbles or voids (col. 8, lines 23-26).

Consequently, Palmer does not discuss controlling the pressure or temperature during resin infiltration. In particular, Palmer does not disclose or remotely suggest controlling the vacuum pressure together with temperature such that during application of the liquid resin during infiltration, the boiling point curve of the resin is not exceeded, as claimed by Applicant.

It appears that the main point of Palmer is to avoid bubbles in the resin by degassing the resin before it is applied. In contrast, the present invention avoids the formation of bubbles by controlling the resin application, including resin infiltration and curing, by controlling the vacuum pressure and the temperature such that the boiling point curve of the resin is not exceeded. Such a concept is not disclosed or remotely suggested in Palmer.

Palmer indicates that the tool controlling liquid resin flow for impregnation (infiltration) is heated to achieve a desired resin viscosity (col. 13, lines 36-44).

Further, Palmer merely indicates that vacuum pressure is drawn through the vacuum line 218 with resin inlet valve 202 closed to determine that no vacuum leaks are present before opening the resin inlet valve 202 (col. 14, lines 50-54). Palmer discloses that after resin impregnation, the assembly is heated and the cure cycle is completed under vacuum pressure (col. 15, lines 7-12). However, there is no disclosure or suggestion in Palmer regarding controlling the vacuum pressure together with

the temperature during resin application, resin infiltration and curing.

As acknowledged by the Examiner, Palmer does not disclose that vacuum pressure is controlled in such a way that the boiling point curve is not exceeded, as claimed by Applicant. The Examiner cites to Livesay as disclosing controlling the vacuum pressure during the resin curing to prevent boiling (Office Action, page 7). Applicant's claimed invention provides for the control of vacuum pressure together with temperature, rather than control of vacuum pressure alone as apparently assumed by the Examiner.

Further, as discussed above in connection with Livesay, Livesay does not disclose or remotely suggest that vacuum pressure and temperature are controlled together, as claimed by Applicant. In particular, Livesay does not disclose or remotely suggest that vacuum pressure and temperature are controlled during resin infiltration, as claimed by Applicant.

Therefore, combining the disclosures of Palmer and Livesay as suggested by the Examiner would not lead one skilled in the art to the present invention, since neither Palmer nor Livesay disclose that vacuum pressure is controlled together with temperature such that during application of the liquid resin, including during resin infiltration and curing, the boiling point curve of the resin is not exceeded.

In addition, the Examiner has apparently misinterpreted claim 68, which states that a reduction in the application by vacuum pressure is brought about in a curing phase following an injection phase. A reduction of vacuum pressure means that the pressure is raised, rather than lowered as indicated by the Examiner in the Office Action (e.g., see Applicant's Figure 12 and the corresponding description in the specification on page 33, first paragraph).

The reduction of the vacuum pressure in the curing phase enables the control of the fiber volume content. Neither Livesay nor Palmer disclose reducing the vacuum pressure during the curing phase, as set forth in Applicant's claim 68.

Applicant respectfully submits that the present invention is not anticipated by and would not have been obvious to one skilled in the art in view of Livesay, taken alone or in combination with Palmer or any of the other references of record.

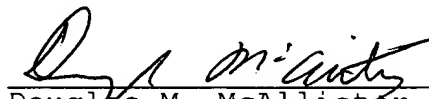
Withdrawal of the rejections under 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a) is therefore respectfully requested.

Further remarks regarding the asserted relationship between Applicant's claims and the prior art are not deemed necessary, in view of the amended claims and the above discussion. Applicant's silence as to any of the Examiner's comments is not indicative of an acquiescence to the stated grounds of rejection.

Conclusion

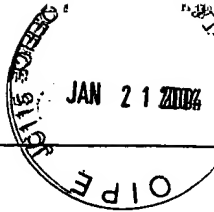
In view of the above, the Examiner is respectfully requested to reconsider this application, allow each of the presently pending claims, and to pass this application on to an early issue. If there are any remaining issues that need to be addressed in order to place this application into condition for allowance, the Examiner is requested to telephone Applicant's undersigned attorney.

Respectfully submitted,



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FORM PTO-1449

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SERIAL NO.:
09/782,612**INFORMATION DISCLOSURE STATEMENT BY APPLICANT**

(Supplemental)

APPLICANT(S): B. Hinz

FILING DATE: February 13, 2001

GROUP:

U.S. PATENT DOCUMENTS

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | NAME | CLASS | SUB- CLASS | FILING DATE |
|---------------------|----|-----------------|--------------|------------------|-------|---------------|----------------|
| | AA | 4,942,013 | Jul 17, 1990 | Palmer et al. | | | |
| | AB | 5,403,537 | Apr 04, 1995 | Seal et al. | | | |
| | AC | 2002/0020934 | Feb 21, 2002 | Hinz | | | |
| | AD | 2003/0011094 | Jan 16, 2003 | Filsinger et al. | | | |
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FOREIGN PATENT DOCUMENTS

| | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB- CLASS | TRANS- LATION YES NO |
|--|----|--------------------|--------------|---------------|-------|---------------|----------------------------|
| | AE | 1 441 919 | Jul 07, 1976 | Great Britain | | | |
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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, etc.)

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EXAMINER

DATE CONSIDERED

EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.